UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/510,353 | 06/23/2005 | Klaus Hoffesommer | H 2293US | 8385 |

1218 7590 10/06/2009
CASELLA & HESPOS
274 MADISON AVENUE
NEW YORK, NY 10016

| EXAMINER | |
|---|---|
| TRAN, THUAN Q | |
| **ART UNIT** | **PAPER NUMBER** |
| 3693 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 10/06/2009 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) |
|---|---|---|
| | 10/510,353 | HOFFESOMMER, KLAUS |
| | Examiner | Art Unit |
| | Thuan Tran | 3693 |

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *09 June 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,8-15,19,20,22-68 and 73-82* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,8-15,19,20,22-68 and 73-82* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 June 2009* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

## DETAILED ACTION

### Status of Claims

1. This action is in reply to the amendment filed on 6-9-2009.

2. Claims 1, 15, 29, 43, 57, 61, 65, 75, and 76 have are currently amended.

3. Claims 81 and 82 are new.

4. Claims 1, 8-15, 19, 20, 22-68 and 73-82 are currently pending and have been examined.

### *Response to Arguments*

5. Applicant's arguments, filed 6-9-2009, with respect to the claim objections have been fully considered and are persuasive. The objections of claims 76 and 76 have been withdrawn.

6. Applicant's arguments, filed 6-9-2009, with respect to the drawing objections have been fully considered and are persuasive. The objections to the drawings have been withdrawn.

7. Applicant's arguments with respect to the 35 USC 103 rejections of the claims have been considered but are moot in view of the new ground(s) of rejection.

### *Claim Rejections - 35 USC § 101*

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title.

Claims 1, 8-15, 19, 20, 22-68 and 73-82 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Based on Supreme Court precedent, a proper process must be tied to another statutory class or transform underlying subject matter to a different state or thing (Diamond v. Diehr, 450 U.S. 175, 184 (1981); Parker v. Flook, 437 U.S. 584, 588 n.9 (1978); Gottschalk v. Benson, 409 U.S. 63, 70 (1972); Cochrane v. Deener, 94 U.S. 780,787-88 (1876)). The independent claim states method steps such as "repeated discharge operation," "determining," "pushing," and " setting." However this is not sufficient to tie the process claim to a particular apparatus in another statutory class. To qualify as a statutory process, the claim should positively recite the other statutory class to which it is tied, for example by identifying the apparatus that accomplished the method steps (In re Bilski, 545 F.3d 943, 88 USPQ2d 1385 (Fed. Cir. 2008)).

### *Claim Rejections - 35 USC § 112*

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1, 8-15, 19, 20, 22-68 and 73-82 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The added sections to the independent claims are very unclear as to how these limitations are performed and proper antecedent basis. The examiner has attempted to point out all sections of the claims that fail to particularly point out and distinctly claim the subject matter.

- Claim 1 limitations a) and d) states, "repeated discharge operation for all demander vertices." It is unclear how this action is performed by a computer.
- Claim 1 limitation a) states, "If the excess flow to be pushed..." There is insufficient antecedent basis for this limitation in the claim.
- In several sections of Claim 1 the limitations describe a pushing action. It is unclear how this action is performed by a computer.
- Claim 1 limitation e) states, "setting demander vertices with excess flow..." It is unclear how excess flow is determined.
- Claim 1 limitation e) states, "the reflow." There is insufficient antecedent basis for this limitation in the claim.
- Claim 1 limitation e) states, "a min s-t-cut value" It is unclear how this value is determined.

10. The above rejections to Claim 1 are repeated for all the claims with similar limitations. Proper correction is required

### *Claim Rejections - 35 USC § 103*

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains Patentability shall not be negatived by the manner in which the invention was made

12. **Claims 1, 8-15, 19, 20, 22-68 and 73-80** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ahuja et al., Network Flows, in view of Bertsekas at al., "Finding Maximal Benefit/Maximal Cardinality Assignments" in further view of Kalagnanam, US Patent 6,044,361.

13. **As per claim 29:**

Ahuja teaches using network flow bipartite matching to solve various problems related to transmission lines. Specifically Ahuja teaches:

- building a network (see at least page 9 paragraph 3, and section 12.3 on page 469-470)
- in which the transmission lines are represented by transmission vertices (telephone exchanges and transmission facilities) connected to a sink vertex via sink edges of a flow capacity which represents the transmission rate (transmission of voice messages or of data) of the respective transmission line, the sink vertex being sink of a network flow (see at least page 9 paragraph 3);
- in which the senders are represented by sender vertices connected to a source vertex via source edges of a flow capacity which represents the data rate of the respective sender, the source vertex being source of a network flow (see at least page 9 paragraph 3); and
- in which transmission vertices and sender vertices are connected by edges of certain flow capacities (copper wire, see at least page 9 paragraph 3);

Ahuja does not specifically teach the applicant's manner of solving the network flow problem. However, Kalagnanam teaches a system to solve the network flow bipartite matching problem. Specifically, Kalagnanam teaches:

- determining an optimized network flow distribution of flow values through the edges by an iterative flow-method (see at least abstract); and
- deriving the optimized order of assignment from the optimized network flow distribution by assigning the transmission vertices to the sender vertices in correspondence to the flow values of the connecting edges (see at least column 2 line 33-37).

It would have been obvious to one of ordinary skill in the art at the time of the invention to solve the described network flow bipartite matching problem using Kalagnanam's system with motivation more quickly and efficiently solve the multi-objective matching problem, see at least column 5 line 45 to column 6 line 18.

Kalagnanam further teaches a multi-assignment backjumping algorithm to generate multiple solutions by applying Iterative bipartite Matching and maximum flow algorithm, see at least abstract. Ahuja teaches the details of the Iterative bipartite Matching and maximum flow algorithm, see at least section 12.3 and the section titled Bipartite Matching Algorithm on pages 478-480. Together Kalagnanam in view of Ahuja teach the details of determining an optimized network flow distribution of flow values through the edges by an iterative flow-method. Specifically, Kalagnanam in view of Ahuja teach:

- determining an optimized network flow distribution of flow values through the edges by an iterative flow-method comprising the following steps a) to e):
    - a) repeated discharge operation for all active demander vertices, which are defined as vertices at which the sum of the incoming flow is higher than the sum of the outgoing flow along an edge being admissible according to a labeling function, where the following rule applies: If the excess flow to be pushed from an active demander vertex is greater than the residual capacity of some current edge where the residual capacity of an edge is the capacity of the edge minus the flow that has already been pushed along this edge and if there is another admissible edge leaving this vertex with a residual capacity which at least equals the excess flow, then the flow will be pushed along the edge with sufficient residual capacity (see at least Ahuja section 12.3, each arc has a max of unit capacity);
    - b) pushing excess flow from security vertices to the sink along edges with a non zero residual capacity (see at least Ahuja section 12.3);
    - c) setting vertices with excess flow active and updating the excess flow of each vertex (see at least Kalagnanam column 12 line 1-10);
    - d) repeated discharge operation for all active supply vertices where flows are pushed back to demander vertices (see at least Kalagnanam column 12 line 1-10) and where the following rules apply:

- 1. a flow on an edge leaving a demander vertex that has no other edge leaving this demander vertex and leading to another supply vertex is never pushed back (see at least Ahuja section 12.3);
- 2. if the flow that had been pushed along a current edge from the demander vertex is equal to the capacity of the edge then other edges that are admissible according to a labeling function would have priority under the condition that (see at least Ahuja section 12.3):
    - i) If there is another admissible edge according to the labeling function from some demander vertex to the supply vertex with a flow that is less than the capacity of the edge and at least equal to the excess flow then the excess flow of supply vertex is pushed back along this edge to the demander vertex (see at least Ahuja section 12.3);
    - ii) if there are other admissible edges to this supply vertex according to the labeling function where for each edge the flow is less than the capacity and where the sum of flows along these other edges is at least equal to the excess flow of the supply vertex then the excess flow is pushed back along these edges to the respective demander vertices (see at least Ahuja section 12.3);

- e) setting demander vertices with excess flow after the reflow from supply vertices active and updating the excess flow of each vertex (see at least Kalagnanam column 12 line 1-10);.
- where the steps a) to e) are iteratively repeated until the flow the sink vertex equals a min s-t-cut value or there is no more active vertex or the number of iterations has reached a maximum value (see at least Kalagnanam column 12 line 1-10);

It would have been obvious to one of ordinary skill in the art at the time of the invention to solve the bipartite matching problem using the method of Ahuja with motivation to efficiently solve the problem within a useful amount of time, namely a worst case bound of O((square root (n)) m), see at least Ahuja theorem 12.1.

14. **As per claims 30:**

Ahuja further teaches:

- wherein in the iterative flow-method comprises a discharge operation pushing a flow from an active vertex at which the sum of the incoming network flow is higher than the sum of the outgoing network flow along an admissible edge (see at least page 180 paragraph 3), where the admissibility of an edge is defined by a label of the vertex connected to the active vertex by the respective edge (see at least page 184 paragraph 2).

15. **As per claims 31:**

Ahuja further teaches:

- further comprising a relabeling operation changing the label of the active vertex if there is no admissible edge along which the discharge operation can be performed (see at least page 184 paragraph 2).

16. **As per claims 32:**

Ahuja further teaches:

- wherein, when the label of the vertex to be discharged is Y(v) and the label of a vertex connected by an edge is Y(w), said edge being admissible if Y(v) = Y(w) + 1, and wherein the label Y(v) of the vertex to be discharged is increased by one in the relabeling operation (the procedure augment, see at least Figure 6.17).

17. **As per claims 33:**

Ahuja further teaches:

- comprising discharge operations pushing flows from sender vertices to transmission vertices and discharge operations pushing flows from transmission vertices to sender vertices (see at least page 180 paragraph 3).

18. **As per claims 34:**

Ahuja further teaches:

- wherein the discharge operation is performed iteratively for sender vertices and transmission vertices (the while loop in the algorithm, see at least Figure 6.12).

19. **As per claims 35:**

Ahuja further teaches:

- determining an upper limit of the highest possible total flow through the edges (see at least page 185 paragraph 1); and
- iteratively distributing the network flow through the edges until at least one of the conditions is fulfilled (see at least page 184 paragraph 3):
- i) the network flow corresponds to the upper limit of the highest possible total flow (see at least page 185 paragraph 1),
- ii) the sum of the incoming network flow at a vertex equals the sum of the outgoing network flow of said vertex for each transmission vertex and for each sender vertex,
- iii) the number of iterations has reached a given maximum value.

Examiner Note: Only one of the conditions is particularly pointed out because of the applicant's use of the phrase "at least one of" in the claim language.

20. **As per claims 36:**

Kalagnanam further teaches:

- wherein assigning the transmission vertices to the sender vertices is performed by an iterative assigning operation (see at least column 9 line 55 to column 10 line 38).

21. **As per claims 37:**

Kalagnanam further teaches:

- wherein the assigning operation, in a first stage, assigns a transmission vertex to a sender vertex only if these vertices are connected by an edge for which the flow value equals the capacity (see at least column 9 line 55 to column 10 line 38).

22. **As per claims 38:**

Kalagnanam further teaches:

- wherein the assigning operation first assigns transmission vertices to such sender vertices which are connected to the respective transmission vertex by an edge for which the flow value equals the flow value of the corresponding source edge before it assigns transmission vertices to such sender vertices which are connected to the respective supply vertex by an edge for which the flow value is equal to or higher than a remaining flow value of the corresponding sink edge which has not yet been assigned to a sender vertex (see at least column 9 line 55 to column 10 line 38).

23. **As per claims 39:**

Kalagnanam further teaches:

- wherein the first stage is performed until all transmission vertices and sender vertices which are connected by edges for which the flow value equals the capacity are assigned (see at least column 9 line 55 to column 10 line 38).

24. **As per claims 40:**

Kalagnanam further teaches:

- wherein the assigning operation, in a second stage, assigns a transmission vertex to a sender vertex if the flow value of the connecting edge corresponds to the flow value of the corresponding source edge reduced by a fraction of its data rate already assigned to a transmission vertex, or to the flow value of the corresponding sink edge reduced by a fraction of its transmission rate already assigned to a sender vertex (see at least column 9 line 55 to column 10 line 38).

25. **As per claims 41:**

Kalagnanam further teaches:

- wherein the assigning operation, in the second stage, first assigns such transmission vertices to sender vertices for which the flow value of the connecting edge corresponds to the flow value of the corresponding source edge reduced by a fraction of its data rate already assigned to a transmission vertex (see at least column 9 line 55 to column 10 line 38).

26. **As per claims 42:**

Ahuja further teaches:

- wherein the certain flow capacity of an edge connecting a sender vertex to a transmission vertex is given by the smaller one of the capacity of the respective source edge and the capacity of the respective sink edge (see at least section 12.3).

27. **As per claims 1, 8-15, 19-20, 22-28, and 43-56:**

Ahuja in view of Kalagnanam teach optimizing the data transfer through a transmission system. Ahuja further teaches:

Optimizing the order assignment of a number of supplies (processors) to a number of demanders (tasks, see at least Application 12.9, "Scheduling on Parallel Machines" on pages 468-469).

Balancing a number of loan accounts with a number of collateral securities, where each loan account has a certain loan value and each collateral security has a certain security value (see at least last paragraph on page 568).

Optimizing the order of assignment of a number of tasks to a number of processors, where each processor has a certain processor capacity and each task has a certain capacity demand (see at least Application 12.9, "Scheduling on Parallel Machines" on pages 468-469).

28. **As per claims 65:**

Ahuja teaches using network flow bipartite matching to solve various problems related to transmission lines. Ahuja does not specifically teach that the system is performed on a computer. However, Kalagnanam teaches using network flow bipartite matching to solve various problems related to transmission lines. Together they teach the limitations of this claim. Specifically Ahuja in view of Kalagnanam teaches:

- a network comprising: a) a transmission vertex for each transmission line, b) a sender vertex for each sender, c) a sink vertex, d) a source vertex, e) edges, each having a certain flow capacity and connecting a transmission vertex and a sender vertex, f) sink edges, each connecting the sink vertex to one of the transmission vertices and having a flow capacity representing the transmission rate of the respective transmission line, and g) source edges, each connecting the source vertex to one of the sender vertices and having a flow capacity representing the data rate of the respective sender (see at least Ahuja section 12.3);
- a network flow unit for determining an optimized network flow distribution through the network, the optimized network flow being represented by flow values through the edges (see at least Ahuja section 12.3); and
- an assignment unit for assigning the transmission lines to the senders by assigning the transmission vertices to the sender vertices in correspondence to the flow values of the connecting edges (see at least Kalagnanam column 9 line 55 to column 10 line 38).

- a supply input unit for inputting supply data representing supplies and their supply amounts (see at least Kalagnanam column 8 line 33-43),
- a demander input unit for inputting demander data representing demanders and their demand amounts (see at least Kalagnanam column 8 line 33-43),
- an access input unit for inputting access data representing, for each demander, the corresponding supplies, which can be accessed by the respective demander for satisfying its demand amount (see at least Kalagnanam column 8 line 33-43);
- a network construction unit for constructing a network (see at least Kalagnanam column 8 line 44-47),

It would have been obvious to one of ordinary skill in the art at the time of the invention to solve the bipartite matching problem using the method of Ahuja with motivation to efficiently solve the problem within a useful amount of time, namely a worst case bound of O((square root (n)) m), see at least Ahuja theorem 12.1.

29. **As per claims 66:**

Kalagnanam further teaches:

- wherein the input units are formed by a single input unit (the centralized repository of all data, column 8 line 17-19).

30. **As per claims 67:**

Kalagnanam further teaches:

- wherein the input units are integrated into a single device (the server, column 8 line 17-19).

31. **As per claims 68:**

Kalagnanam further teaches:

- wherein the network construction unit, the network flow unit, and the assignment unit are realized by a single calculator unit (server 302, column 8 line 33-43).

32. **As per claims 75:**

Kalagnanam further teaches:

- Computer program product for optimizing the data transfer through a transmission system comprising a number of senders and a number of transmission lines comprising instructions which, when loaded into a computer, cause said computer to perform a method as claimed in claim 29 (server 302, column 8 line 33-43).

33. **As per claims 79:**

Kalagnanam further teaches:

- Storage medium comprising stored data which represent a computer program product as claimed in claim 75 (see at least column 8 line 44-54.

34. **As per claims 57-64, 73-74, 76-78, and 80:**

Ahuja in view of Kalagnanam teach optimizing the data transfer through a transmission system. Ahuja further teaches:

Optimizing the order assignment of a number of supplies (processors) to a number of demanders (tasks, see at least Application 12.9, "Scheduling on Parallel Machines" on pages 468-469).

Balancing a number of loan accounts with a number of collateral securities, where each loan account has a certain loan value and each collateral security has a certain security value (see at least last paragraph on page 568).

Optimizing the order of assignment of a number of tasks to a number of processors, where each processor has a certain processor capacity and each task has a certain capacity demand (see at least Application 12.9, "Scheduling on Parallel Machines" on pages 468-469).

***Conclusion***

35. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thuan Tran whose telephone number is 571-270-1832. The examiner can normally be reached on Monday-Friday 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Kramer can be reached on 571-272-6783. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/James A. Kramer/
Supervisory Patent Examiner, Art Unit 3693

Thuan Tran
Patent Examiner
10-1-2009